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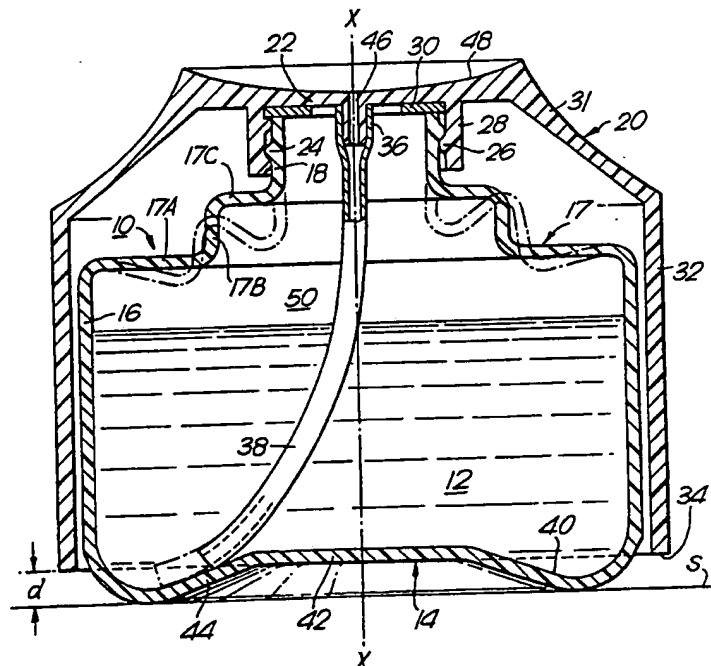
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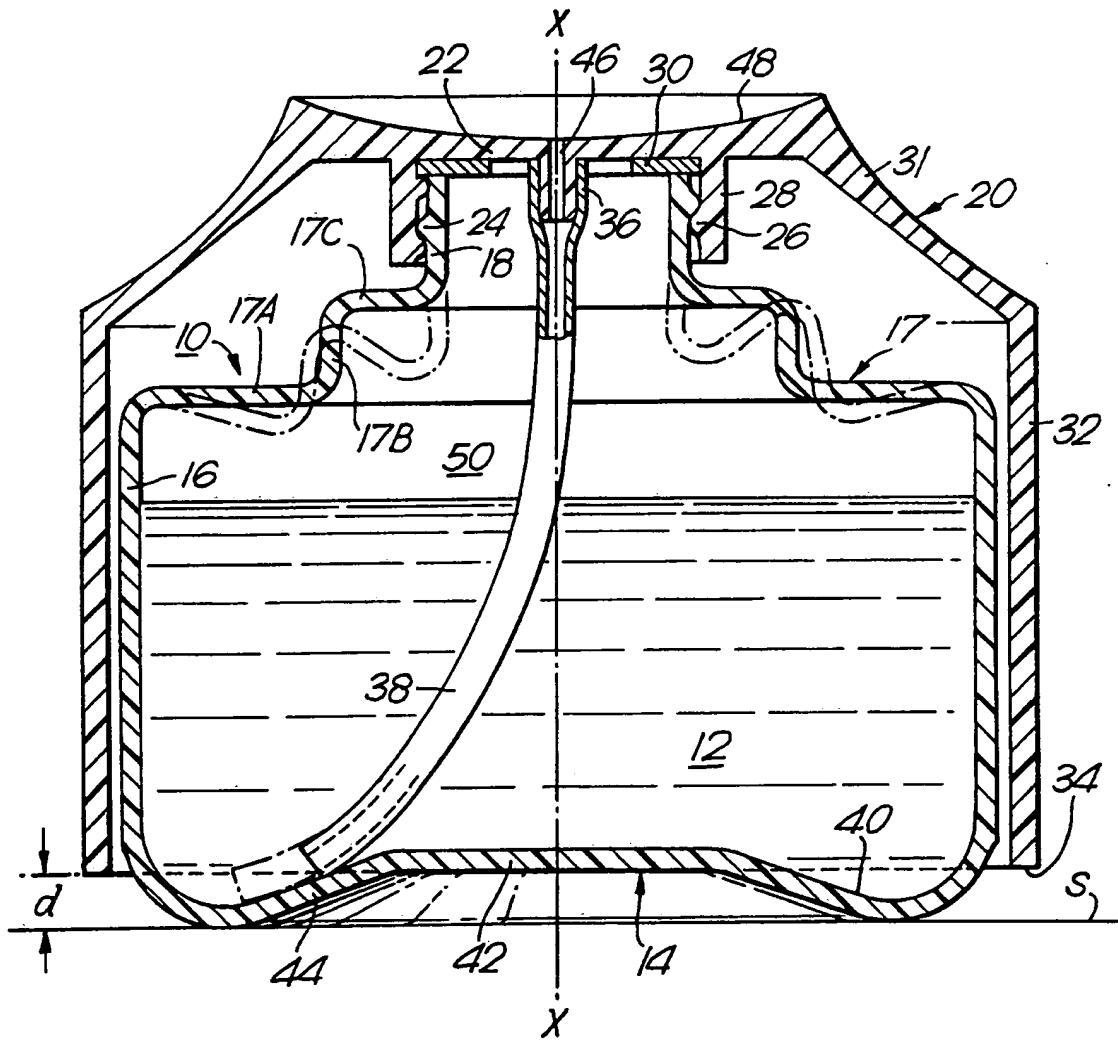
(54) **Liquid dispenser bottle**

(57) A dispenser for a liquid hand lotion has a compressible plastics bottle (10), and a rigid outer shell (20) which surrounds the bottle and has a lower free edge (34) which is normally supported by the bottle at a small distance above a horizontal support surface S. The bottle is screwed to the underside of the outer shell, and a flexible (38) diptube communicates the bottom of the bottle with a dispensing orifice (46) formed in the top of the shell.

The product to be dispensed is charged into the container leaving a headspace (50), and for dispensing the user presses down on the outer shell so causing increased air pressure in the headspace to force product through the diptube to the dispensing orifice. After dispensing, resilience of the bottle, assisted by any remanent excess air pressure in the headspace, returns the container to its former condition in preparation for the next dispensing operation.



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"LIQUID DISPENSERS"

This invention relates to liquid dispensers, that is to say, dispensers from which a level-seeking liquid product can be repeatedly dispensed in small quantities on demand. The invention is particularly (but not  
5 exclusively) concerned with dispensers for cosmetic lotions, liquid soaps and similar liquid products of a cosmetic/hygenic nature, especially those which are sensitive to shear.

In accordance with the invention there is provided a  
10 liquid dispenser, which comprises a container having an opening defined by a top end portion thereof, and a diptube arranged to communicate the bottom of the container interior with a dispensing orifice on the dispenser exterior, the container being downwardly  
15 compressible and resilient so as to be capable of undergoing repeated vertical compressions and subsequent resilient expansions during each compression of which a quantity of a liquid product in the container is expelled via the diptube and the dispensing orifice and during each  
20 expansion of which air is drawn into the container.

Preferably the liquid dispenser includes a rigid  
outer member which carries the diptube and to which the said top end portion of the container is sealingly attached, the outer member having a lower free edge  
25 located a predetermined distance above the bottom of the container so as to act as a limiting stop for each said compression of the container.

A liquid dispenser embodying the invention will now be described, by way of example only, with reference to  
30 the accompanying drawing which shows the dispenser in central vertical section. It is to be understood that the dispenser is circular as seen in plan view and is shown enlarged to approximately  $1\frac{1}{2}$  times its normal size.

Referring now to the drawing, a liquid dispenser

for a hand cream or like substantially non-viscous, and therefore level-seeking, cosmetic lotion comprises a bottle 10 which is moulded from a suitable polymeric material and contains the liquid product 12 to be  
5 dispensed. The bottle has an integral standing base 14, and a generally cylindrical side wall 16 upstanding from the base periphery, a stepped shoulder 17, and a reduced diameter, generally cylindrical neck 18 attached by the shoulder to the top of the side wall. The  
10 shoulder is formed of a substantially cylindrical portion 17B, the diameter of which is intermediate those of the side wall and the neck, and outer and inner annular portions 17A, 17C which respectively join the cylindrical portion 17B to the side wall and to the neck as shown.  
15 The neck 18 defines an upwardly facing mouth for the bottle when the latter is supported on a horizontal surface S as shown. For clarity the mouth is not separately referenced.

In addition to the bottle 10 the dispenser has a  
20 downwardly open outer shell 20 having a generally horizontal closure panel portion 22 by which the container mouth is closed. The outer shell is screwed onto the container neck in conventional manner, by cooperation of complementary screw thread formations 24, 26 which are  
25 respectively formed on the exterior of the container neck and on the interior of a short interior skirt 28 which is integrally formed on the underside of the closure panel.

An annular gasket 30 of a suitable elastomeric material may be located as shown against the underside of  
30 the closure panel 22 within the skirt 28 for ensuring that the liquid product 12 cannot escape past the thread formations for transit etc.

The shell 20 is moulded from a suitable polymeric material and is substantially rigid. It is symmetrical

about the central axis XX of the bottle 10 and generally surrounds the bottle as shown. The shell has a contoured shoulder 31 surrounding the closure panel 22, and a generally cylindrical and extensive outer skirt 32 which extends downwardly from the shoulder to a lower free edge 34 which is located a small distance 'd' above the support surface S when the dispenser is supported upon it as shown. The shell carries decorative, promotional and/or informative printing, and is shaped to provide a pleasing appearance for the dispenser as a whole. In addition, and for the purpose to become apparent, it is spaced from the bottle so as to allow limited relative vertical movement of the bottle within it.

In the centre of the closure panel, on the axis XX, the closure panel is formed on its underside with a spigot 36 onto which one end of a diptube 38 is push-fitted. The diptube is located within the bottle, and is flexible and of such a length that during compression of the bottle its other end will always be located substantially at the lowest point of the product 12. For this purpose the base of the bottle is peripherally formed with an annular well 40, and has a central boss 42 with a peripheral shoulder 44 down and up which the bottom end of the diptube may ride.

A hole 46 formed through the spigot 34 communicates the interior of the diptube with the exterior of the dispenser at the centre of the closure panel 22, and so forms what may be regarded as a dispensing orifice for the container. A shallow depression 48 is formed in the upper surface of the closure panel to provide a small holding reservoir for product 12 received from the dispensing orifice, as will become apparent.

The dispenser is conventionally charged with product 12 through the mouth of the bottle 10 leaving a headspace

50, and the bottle and the shell 20 are screwed together in conventional manner. For dispensing, the user places the dispenser on a support surface S and, by pushing down on the closure panel 22 with her or his fingers, 5 compresses the bottle vertically so that increased pressure of air in the headspace 50 forces a quantity of the product to pass through the diptube 38 and into the depression 48 via the orifice 46. The user may then apply product taken from the depression as desired.

10 The compression of the bottle largely occurs at the two annular portions 17A, 17C of the bottle shoulder 17, the broken lines indicating the positions adopted by these two portions after compression has taken place. Also indicated in broken lines is the position adopted by the 15 bottom end of the diptube 38 after the compression.

After dispensing, the user releases the dispenser, so allowing the bottle to expand vertically by virtue of resilience of the bottle, in particular its shoulder 17, assisted by any excess air pressure remaining in the 20 headspace 50. Air and any available product remaining in the depression 48 are therefore slowly drawn into the bottle through the diptube, so enabling the bottle together with the outer shell 20 to regain their original conditions in preparation for the next dispensing 25 operation. Similar pumping operations of the dispenser thereafter enable substantially the whole contents of the dispenser to be used, the level-seeking properties of the product and the location of the bottom end of the diptube ensuring that only a small residue of inaccessible product 30 will remain. If desired, the bottle can then be replaced or refilled to recharge the dispenser.

In addition to its aesthetic and informative functions as mentioned above, the skirt 32 also serves to prevent abuse (whether inadvertent or otherwise) by the

user, by limiting the compression of the bottle (and accordingly the amount of product dispensed) during each dispensing operation. The bottle can only be compressed by the distance 'd' by which the lower free edge 34 of its skirt is short of the support surface S.

Modifications and variations of the liquid dispenser particularly shown and described possible within the scope of the invention. For example, the skirt 32 may be apertured and/or peripherally discontinuous, and in one modification it is omitted altogether. Also, rather than discharge into a holding reservoir as shown in the drawing, the dispensing orifice of a liquid dispenser in accordance with the invention may be provided by an extended or otherwise shaped nozzle suited to the purpose for which the dispenser is intended.

In a modification of the described embodiment the shoulder 17 is generally planar and formed of a plurality of concentric corrugations which provide flexure points for the bottle during its compression and expansion.

In the described embodiment, the dispensed product and the air which replaces it are required to pass in opposite directions through the same flow path. If desired, however, a dispenser in accordance with the invention may be provided with a non-return valve through which the replacement air may pass directly into the container headspace, that is, without having to pass through the product in the container. Another non-return valve may then advantageously be associated with the normal product dispensing path to prevent simultaneous air flow through that route also.

CLAIMS:

1. A liquid dispenser, which comprises a container having an opening defined by a top end portion thereof, and a diptube arranged to communicate the bottom of the container interior with a dispensing orifice on the dispenser exterior, the container being downwardly compressible and resilient so as to be capable of undergoing repeated vertical compressions and subsequent resilient expansions during each compression of which a quantity of a liquid product in the container is expelled via the diptube and the dispensing orifice and during each expansion of which air is drawn into the container.
2. A liquid dispenser according to claim 1, including a rigid outer member which carries the diptube and to which the said top end portion of the container is sealingly attached, the outer member having a lower free edge located a predetermined distance above the bottom of the container so as to act as a limiting stop for each said compression of the container.
3. A liquid dispenser according to claim 2, wherein the outer member is peripherally continuous so as to surround the container generally at a spacing therefrom.
4. A liquid dispenser according to claim 2 or claim 3, wherein the outer member has a closure panel which closes the said opening of the container and has an apertured attachment for the diptube on the underside thereof, and a depending skirt which surrounds the closure panel and is formed with means in engagement with complementary means on the top end portion of the container to attach together the container and the outer member.
5. A liquid dispenser according to any preceding claim, wherein the container base is formed with a peripheral well, and a central boss with a rounded shoulder down and



up which the diptube may ride during compression and expansion of the container.

6. A liquid dispenser, substantially as hereinbefore described with reference to the accompanying drawing.